MENINGOCOCCAL INFECTION

General data

- The clinical manifestations of meningococcal infection can be quite varied but the meningococcal meningitis remains a major health problem.
- After the great epidemics in Europe in 1800-1805, with 70-90% lethality, the anti-meningococcal serum discovered in 1888 and then, the sulfamides and penicillin have drastically reduced the morbidity and mortality.
- After 1968 it has been observed the reappearance of meningococcal infection in Africa and then in the world (rhino-pharingitis, acute respiratory apparatus infections, meningitis and septicaemia).
- The most affected is the population in the south saharan where meningococcal meningitis is endemo-epidemic.

The characteristics with epidemiological importance of the meningococcus are:

- from the total of 13 serogroups, the most implicated in producing different clinical manifestations are: A, B, C, Y, W135;
- the capsular polysaccharides of the serogroups A, C, Y, W135 and an internal protein of serogroup B have been permitted the getting of the best immunogenicity vaccines;
- the environment resistance is relatively low, so the decontamination by natural, mechanical, thermal ways and by usual decontaminates is efficient;
- the meningococcal strains are resistant to sulphamides in proportion of 50-60%, but their sensibility to antibiotics is generally conserved (penicillin, cloramphenicol, ryphamicin, minocyclin);
- the meningococcus colonises easily and persistently the pharyngeal and nasal fossae’s epithelia.
Epidemiological process

I. Sources of pathogenic agents

The meningococcus sources are:

- **The sick man** with different localisations with or without clinical manifestations;

- **The meningococcus carrier man**:
  
  - *pre-infectious carriers* with various spreading periods; they are infectious and hard to detect in the absence of "the index case";
  
  - *healthy carriers* in the rhinopharynx, in different proportions in relation to the groups origin; the increase of their prevalence indicates an epidemic risk; the meningococcus carrier status is immunizing;
  
  - *after-ill carriers*:
    
    - *convalescents* (1-10%) with spreading possibilities for 3 months and even over 4 months;
    
    - *chronic* (1-2%) with sporadically elimination through pharyngeal secretions, for over 2 years.

* In some collectivities (military, boarding schools, medical-social assistance units) 20-35% of the persons can become a meningococcal carrier at least once, for 1-3 years.

* The rhino-pharyngeal secretions are the main pathologic products of the meningococcus spreading by the sources.

II. Modes and ways of transmission

- **The direct mode** is frequently implicated because the meningococcal resistance is low. The spreading by septic drops is frequent in crowds, in different conditions of unhygienic life.

- **The indirect mode** can intervene in meningococcal transmission when it contaminates for a short period of time the air, the objects or the hands.
III. Receptivity

- **Receptivity (susceptibility)** is not general and depends on the organism general resistance. The children until 6 months age are protected in over 50% of cases if the mother’s specific antibodies are present. Receptivity is extremely high for children of 6-12 months age; that explains why in their case, 50-60% of the meningitis are produced by the meningococcus.

- Adults have a low receptivity, they often get occult immunizing infections. The adults with a low general resistance, with immunosuppression, cranial-encephalic traumatisms, “the gateway” damage, can get severe infections, including meningitis.

- Although the meningococcal presence in the organism determines specific serogroup immunization with crossed-protection possibilities, the amount of the antibodies decreases quickly and the infection may repeat itself on the same person.

- The post-vaccinal immunity assures a 3-5 years protection and re-vaccination increases rapidly and strongly the amount of the antibodies.

- After 7-30 days from the pharynx colonization with meningococcus, the amount of specific antibodies increases at protective levels.

- The simultaneous colonization with bacteria related to the meningococcus may determine cross-reactions with anti-meningococcus antibodies and so to increase susceptibility for the systemic infection with *N. meningitidis*. 
Manifestation forms of the epidemiological process

In relation to many parameters depending on the human organism, the meningococcus and the natural and social-economical conditions, the epidemiological process can manifestate sporadically, endemically or epidemically.

- **The sporadic manifestation** characteristic to Europe and North America and is present in the social-economical favoring populations from all the geographical areas (Romania: 5-15%ooo inhabitants).

- **The endemic manifestation** is present in Africa, especially in the south-Saharan countries and in small proportions in collectivities with risk profiles, with a hygienic life style from other geographical areas.

- **The epidemic manifestation**, excepting the great epidemics in the south-Saharan area caused by serogroup A and C, is localized in the perimeter of some crowd families, barracks, jails, refugee camps, medical-social assistance units. During the epidemic evolution the healthy meningococcal carriers prevalence increases strongly (50-90% of the affected population).
Prevention

# General prevention include the general resistance increase; risk groups surveillance; avoiding the damage of the protective mechanisms at the rhino-pharyngeal “gateway”; avoiding and correct treatment of the cranial-cerebral traumatisms; detecting and “sterilizing” the carriers; protection of the children liable to frequent rhino-pharyngitis, tonsillitis, pharyngitis; avoiding crowds; hygienization of the spaces for activities and inhabit; periodic decontamination, including chemical substances, of the risk collectivities; protection of other infectious diseases convalescents; periodic estimation of meningococcal circulation in collectivities; sero-epidemiological inquiries for the estimation of the immune background for the different circulating serogroups, population education.

# Special prevention measures refer to:

- **chimioprevention** with sulphamides; it will be used only in the areas where the meningococcal circulate strains are keeping their sensibility;

- **antibioprevention** is indicated for the pharyngeal carriers “sterilization” and for the protection of direct contacts with a meningococcal source, because they present a high risk for the meningian infection; it is not populationally used; in the endemic areas, antibioprevention can precede the start of immunization campaign;

# Specific prevention includes:

- **vaccinoprevention** that can be realized with efficient vaccines, based on the polysaccharide antigens which are very active for the serogroups A, C, Y, W135 and on an internal protein for the serogroup B; the use of anti-meningococcal infection monovaccines will take into consideration the geographical zoning of the different serogroups (ex.: France, England, U.S.A., Brazil – C prevails; Europe, South America, Africa – A prevails). In the endemic zones the entire population between 1 and 25 years old can get a tetravalenced vaccine (A, C, Y, W135) with a re-vaccination on the age of 5.
Control

The control in meningococcal infection requires operations realized with great care: epidemiological inquiry; detecting the different types of infection followed by hospitalization; detecting and “sterilizing” the carriers; the reporting will be urgent and nominal; the direct contacts with the meningococcal sources will be protected with antibiotics; decontamination will include chemical substances; vaccinations and re-vaccinations will be practiced; the education for health will be differentiated on groups of age.